

2023 Culvert Replacement Project Project Manual

Village of Caledonia
Project ID: 2023-02

March 2023



Village of Caledonia Engineering Department
5043 Chester Lane, Racine, WI 53402
ATTN: Ryan Schmidt, PE
Village Engineer
rschmidt@caledonia-wi.gov

Project Manual for the
2023-02 Culvert Replacement Project
Village of Caledonia, Racine County, Wisconsin

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PROOF OF RESPONSIBILITY

I hereby certify that all statements herein are made on behalf of

(Name of Corporation submitting bid)

A Corporation organized and existing under the laws of the State of Wisconsin.

A Partnership consisting of _____

An Individual trading as _____

of the City (or County) of _____

State of _____

That I have examined and carefully prepared this proposal from the plans and specifications and have checked the same in detail before submitting this proposal, that I have full authority to make such statements and submit this proposal in (its) (their) behalf; and that said statements are true and correct.

Signature: _____

Title: _____

Subscribed and sworn to before me
this _____ day of _____, 20____.

Notary Public:
County:

My Commission expires _____.

**PROJECT 2023-02
CULVERT REPLACEMENT PROJECT
VILLAGE OF CALEDONIA
RACINE COUNTY, WISCONSIN**

NOTICE IS HEREBY GIVEN that sealed bids will be received by the Village Clerk for the Culvert Replacement Project. All bids must be submitted to the Village Clerk by **2:30 p.m., Wednesday, April 5, 2023** at the Caledonia Village Hall, 5043 Chester Lane, Racine, Wisconsin. All bids received will be opened and publicly read at the Village Hall on Wednesday, April 5, 2023 at 2:31 p.m. Bids shall be in a sealed envelope marked “2023 Culvert Replacement Project Bid”. The work can be generally described as the removal and replacement of existing CMP culverts with equivalent sized RCP culverts in two areas of the Village. There are 9 culverts of varying diameters and lengths. All culverts are underneath existing asphalt roadways. The work also includes the installation of a field inlet and short extension of storm sewer pipe.

All proposals must be submitted on a form provided for the purpose and must be accompanied by a \$5,000.00 certified check or bid bond made payable to the Village of Caledonia to guarantee that if the proposal is accepted, a contract will be entered into and a performance bond will be furnished pursuant to s. 779.14 WI Stats., in the amount of the total contract price. The proposal shall include the proof of responsibility, the bid form, and the bid bond.

The Village Board reserves the right to accept or reject any and all bids, to waive any informalities in bidding and to award a contract to the bidder, who will best serve the interests of the village.

All work under this contract shall be in accordance with the State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, Current Edition, the Supplemental Specifications, Current Edition, the Standard Specifications for Sewer and Water Construction in Wisconsin (current edition including supplements), and these special provisions which are on file at the Caledonia Village Hall.

Electronic copies of the bid documents, in Portable Document Format (PDF), will be available by Friday March 24, 2023 and may be downloaded for free at www.caledonia-wi.gov.

Dated March 15th, 2023

Advertisement Dates: March 22nd, 2023
March 29th, 2023

Joslyn Hoeffert
Village Clerk

PROSECUTION AND PROGRESS: The successful bidder shall agree to have all the work substantially completed as of July 31st, 2023. Award of this contract is expected to occur on or around April 11th, 2023 after which the contractor shall submit the signed agreement and payment/performance bonds. Work may commence soon thereafter. When work on a segment or segments of the total proposed work begins, it shall continue at the rate of at least forty (40) hours per week until the proposed work or the segment(s) of the total proposed work for the calendar year is/are completed. If the successful bidder is unable to make satisfactory delivery during the period of this contract, the Village will meet its requirements by purchase on the open market and will charge any difference in price which they are required to pay to the account of the successful bidder.

BID FORM

OFFICIAL BID TO:
VILLAGE BOARD, VILLAGE OF CALEDONIA
RACINE COUNTY, WISCONSIN

BASE BID - UNIT PRICE BID

| Item | Description | Est. Qty. | Unit | Unit Cost | Total |
|-----------------------|--|--------------|------|-----------|-------|
| 1 | Furnish & Install Class III 24" Round Culvert Pipe Reinforced Concrete w/ Apron End Walls | 44 | LF | | |
| 2 | Furnish & Install Class IV 29"x45" Elliptical Culvert Pipe Reinforced Concrete w/ Apron End Walls | 92 | LF | | |
| 3 | Remove & Replace 6"-8" Farm Tile | 66 | LF | | |
| 4 | Furnish & Install 17"x13" Arch CMP Culvert w/ End Aprons (Slurry Backfill) | 69 | LF | | |
| 5 | Furnish & Install 21"x15" Arch CMP Culvert w/ End Aprons (Slurry Backfill) | 50 | LF | | |
| 6 | Furnish & Install 28"x20" Arch CMP Culvert w/ End Aprons (Slurry Backfill) | 54 | LF | | |
| 7 | Furnish & Install 12" PVC Storm Sewer (w/ Spoil and Slurry Backfill) | 78 | LF | | |
| 8 | Furnish & Install 24" Yard Drain (RCP Pipe) | 2 | EA | | |
| 9 | Furnish & Place Asphalt Trench Patch (Binder Only) | 25 | TON | | |
| 10 | Furnish & Install Medium Rip Rap | 65 | SY | | |
| 11 | Core/Modify Existing Structure | 5 | EA | | |
| Total Base Bid | | | | | |

Name of Company

Address of Company

BY: _____

TITLE: _____

SUBCONTRACTOR'S LIST

| <u>Contractor Name</u> | <u>Contractor Address</u> | <u>Work Being Performed</u> |
|-------------------------------|----------------------------------|------------------------------------|
| | | |
| | | |
| | | |
| | | |
| | | |

INSURANCE AND LIABILITY REQUIREMENTS

LIABILITY AND INSURANCE – The Contractor shall provide and maintain from insurance companies acceptable to the Village of Caledonia, insurance to protect the Contractor, employees of the Contractor, Subcontractors of the Contractor, members of the public, Village of Caledonia and Engineer, and their authorized Officials, employees and agents, against all hazards and risks of loss. The Contractor shall also include the Village of Caledonia and Engineer as additional insureds in liability policies required by the Contract Documents with the exception of Worker’s Compensation. The Contractor shall not commence work under a Contract until he has obtained all insurance required hereunder and has filed certification thereof with the Owner, nor shall the Contractor allow a Subcontractor to commence work until all similar insurance required has been so obtained and filed with the Contractor. The insurance certification shall be in a form that is satisfactory to Owner and shall be signed and dated by an authorized representative of the insurance carrier(s).

- (A) Worker’s Compensation Insurance – The Contractor shall maintain during the life of this Contract the statutory coverage as required by Chapter 102 of the Statutes of the State of Wisconsin, as revised, and all acts amendatory thereof and supplementary thereto, for all employees of the Contractor, and Employer’s Liability Insurance in an amount not less than \$100,000 each accident, \$500,000 Disease Policy Limit and \$100,000 Disease Each Employee. All Subcontractors and suppliers of material shall furnish to the Contractor evidence of similar insurance for all of their respective employees unless such employees are covered by the protection afforded by the Contractor.
- (B) Comprehensive General Liability and Property Damage Insurance – The Contractor shall maintain during the life of this Contract Comprehensive General Liability and Property Damage insurance coverage to protect the Contractor, employees of the Contractor, Subcontractors of the Contractor, members of the public, Village of Caledonia and Engineer, and their authorized Officials, employees and agents, against all claims arising from injuries to members of the public or damage to the property of others arising out of any act or omission of the Contractor or his agents, employees or Subcontractors. In addition, this coverage shall insure the contractual liability assumed by the Contractor under the Contract Documents. The scope of this coverage shall include commercial general liability, premises and operations, independent contractors, products liability and completed operations (which shall be maintained for a minimum period of 2 years after final payment), broad form property damage, contractual liability coverage, explosion and collapse hazard and underground hazard, all subject to the following limits:

Bodily Injury and Property Damage: \$1,000,000 per occurrence and a \$2,000,000 per project General Aggregate

- (C) Comprehensive Automotive Liability and Property Damage Insurance - The Contractor shall maintain during the life of this Contract Comprehensive Automotive Liability and Property Damage insurance coverage to protect the Contractor, employees of the Contractor, Subcontractors of the Contractor, members of the public, Village of Caledonia and Engineer, and their authorized Officials, employees and agents, against all claims for injuries, including uninsured and underinsured motorists coverage, and accidental death to members of the public and damage to property of others arising from the use of motor vehicles, used on or off the construction site, whether they are owned, hired, or non-owned vehicles, all subject to the following limits:

Bodily Injury and Property Damage: \$1,000,000 per occurrence.

- (D) Umbrella - The Contractor shall maintain during the life of this Contract Comprehensive Umbrella Liability covering all referenced liability policies in this contract in an amount no less than \$2,000,000.
- (E) Builder's Risk – The Contractor shall maintain during the life of this Contract Builder's Risk insurance coverage. This insurance shall protect the Contractor and the Village of Caledonia from all insurable risks of physical loss or damage to buildings, structures, and materials and equipment, not otherwise covered under Installation Floater insurance. It shall be of the "all risk" type, with coverages designed for the circumstances which may occur in the particular work included in the Contract. The amount of such insurance shall not be less than the insurable value of the work at completion, including the aggregate value of the buildings, structures, materials and equipment to be erected or installed by the Contractor, less the value of the materials and equipment insured under the Installation Floater insurance. If the work does not include the construction of buildings or structures, the Builder's Risk insurance may be omitted providing the Installation Floater insurance fully covers the work. In the event the property to be installed requires any off premises storage in a warehouse or storage area, the policy shall be extended to provide coverage including transit between such location and the place of installation. Builder's Risk insurance shall provide for losses to be payable to the Contractor and the Village of Caledonia as their interests may appear.

- (F) Installation Floater – The Contractor shall maintain during the life of this Contract Installation Floater insurance coverage. This insurance shall protect the Contractor and the Village of Caledonia from all insurable risks of physical loss or damage to materials and equipment, not otherwise covered under Builder's Risk insurance, while in warehouses, storage areas, during construction, testing and after the work is completed. It shall be of the "all risk" type, with coverages designed for the circumstances which may occur in the particular work included in the Contract. The amount of such insurance shall not be less than the insurable value of the work at completion, including the aggregate value of the materials and equipment to be erected or installed by the Contractor, less the value of the materials and equipment insured under the Builder's Risk insurance. In the event the materials or equipment to be installed requires any off premises storage in a warehouse or storage area, the policy shall be extended to provide coverage including transit between such location and the place of installation. Installation Floater insurance shall provide for losses to be payable to the Contractor and the Village of Caledonia as their interests may appear.

The Contractor shall file with the Village of Caledonia a certification of insurance containing an endorsement to the effect that cancellation or material change of such policies shall not be effective unless thirty (30) days written notice is given to the Village of Caledonia prior to such cancellation or material change.

NOTES: The required limits of liabilities may be obtained with primary liability policies or in combination with an umbrella excess liability policy. Limitations of insurance shall be those specified above, or in the declarations for said policies, whichever is greater. The insurance of the Contractor and all Subcontractors shall be primary and non-contributory. Any insurance maintained by the additional insureds named above shall be excess and non-contributory to the insurance of the Contractor and all Subcontractors.

CONTRACT

THIS CONTRACT made this _____ day of _____, _____, by and between _____

herein called the “Contractor” and the Storm Sewer Utility District, a utility district created by the Village of Caledonia, Wisconsin, pursuant to Wisconsin State Statutes 66.0827, and the Village of Caledonia, Wisconsin, a municipal body, located in Racine County, Wisconsin. The Caledonia Storm Sewer Utility District and the Village of Caledonia herein after collectively called the “Owner”.

WITNESSETH

For and in consideration of the mutual covenants herein contained the parties agree as follows:

ARTICLE 1 SCOPE OF WORK

The Contractor hereby agrees at its own cost and expense to perform, furnish and pay for all work, workmanship, materials, labor, utility services, tools, equipment, appliances, machinery, transportation, appurtenances, services and incidentals, and such additional items not specifically indicated or described that can be reasonably inferred as belonging to the item indicated or described and as required by good practice to provide a complete and satisfactory improvement, system or structure, of any nature whatsoever necessary or convenient to complete the construction of the **2023 CULVERT REPLACEMENT PROJECT, VILLAGE OF CALEDONIA, RACINE COUNTY, WISCONSIN** (hereinafter referred to as the “Project”) as shown on and as described in the:

2023 CULVERT REPLACEMENT PROJECT, VILLAGE OF CALEDONIA, RACINE COUNTY, WISCONSIN

(hereinafter referred to as the “Contract Documents”), in a workmanlike manner and in strict conformity and full compliance with the Contract Documents herein mentioned and made a part of this Contract as fully and completely as if the same were fully set forth herein.

ARTICLE 2 CONTRACT PRICE

The Owner shall pay to the Contractor for the performance of this Contract in the manner and at the times provided in the Contract Documents, subject to the final computation of the exact units of work performed and the basis of the unit prices, and subject to any additions or deductions provided in the Contract Documents, and subject to adjustment in accordance with the Contract Documents. See attached Exhibit A for Unit Prices.

The Contractor agrees to complete the work within the time specified herein and to accept as full payment the amounts computed hereunder and determined by the Contract Documents.

The Contractor agrees that if, within one year after the Completion Date Of The Work, any work provided by the Contractor or any of his subcontractors, suppliers or service providers is found by the Owner to be defective, or not in accordance with the Contract Documents, the Contractor shall, at the Contractor's sole cost and expense and without additional payment from Owner, promptly after receipt of a written notice from the Owner to do so, and in accordance with the Owner's instructions, either correct such work, or, if the work has been rejected by the Owner, remove and replace such work with work that is in accordance with the Contract Documents and not defective.

The Owner, in case the items under this Contract are not finished within the time required, or within an extended time approved in writing by the Owner, is authorized to take charge and finish the work at the expense of the Contractor and the sureties of the Contractor.

ARTICLE 3 COMPONENT PARTS OF THIS DOCUMENT

This Contract consists of the following component parts of the Contract Documents, all of which are hereby made a part of this Contract as fully and completely as if the same were fully set forth herein:

- | | |
|----------------------------|---|
| A. Notice to Bidders | D. Insurance and Liability Requirements |
| B. Proof of Responsibility | E. Contract |
| C. Bid Form | F. Special Provisions |

The Contract Documents form a complete unit, and requirements called for by one are as binding as if called for by all.

**ARTICLE 4 PAYMENT FOR LABOR, SERVICES,
MATERIALS, PLANS AND SPECIFICATIONS**

The Contractor specifically agrees to pay all claims for labor, services, materials, plans or specifications performed, furnished, procured, used or consumed that pertain to the work described in the Contract Documents, including without limitation because of enumeration, fuel, lumber, building materials, machinery, vehicles, tractors, equipment, fixtures, apparatus, tools, appliances, supplies, electric energy, gasoline, motor oil, lubricating oil, greases, state imposed taxes, premiums for worker's compensation insurance and contributions for unemployment insurance, as the obligation of the Contractor.

IN WITNESS WHEREOF, we, the parties hereto, each hereby subscribe this Contract.

(Name of Contractor)

By: _____
Print Name: _____
Office: _____

Attest: _____
Print Name: _____
Office: _____

VILLAGE OF CALEDONIA, WISCONSIN

By: _____
James R. Dobbs
President

Attest: _____
Joslyn Hoeffert
Clerk

CALEDONIA STORM SEWER UTILITY DISTRICT

By: _____
Howard Stacey, Utility President

Provision has been made to pay the liability that will accrue under the above and foregoing Contract.

Caledonia Finance Director

Date: _____

SPECIAL PROVISIONS

GENERAL: Any or all of the provisions in the following documents that are applicable are included in the Specifications for this Contract:

- Wisconsin Manual of Traffic Control Devices
- The Village of Caledonia Ordinances
- State of Wisconsin Department of Transportation Standard Specifications for Highway and Structure Construction, Current Edition and all supplemental specifications.
- State of Wisconsin Department of Transportation Construction and Materials Manual (CMM)
- Standard Specifications for Sewer and Water Construction in Wisconsin, Current Edition and all supplemental specifications.

Whenever the Special Provisions and the Specifications differ, the Special Conditions shall govern. Whenever there is a conflict between the Plans, Specifications or Special Provisions, the Special Provisions shall govern.

SCOPE OF WORK: The work is generally described as the removal and replacement of existing road culverts in 2 areas of the Village of Caledonia. The two areas are Botting Road (between 6 Mile Road and 7 Mile Road) and the West Point/Windmere Subdivision. A project location map is included in the Appendix. The existing culverts are Corrugated Metal Pipe and require replacement with Reinforced Concrete Pipe or equivalent Arched CMP. There is also the extension of a small storm sewer pipe and yard drain in the same subdivision. All the work being completed in advance of the Village's Paving Program and therefore will require slurry backfill on the road crossings and asphalt patch. The subdivision will utilize sand bedding and cover with spoil backfill where specified.

TRAFFIC: The Village Roads on which these projects are located shall remain open to public travel at all times outside of work hours (generally 7am – 4pm). During work hours, the Contractor shall close the road as needed to complete the work with the appropriate traffic control in place per MUTCD standards for full and partial closures. The Contractor may complete the work with slurry backfill to get the road open at the end of the day in lieu of finished asphalt patch.

The Contractor shall utilize County and State Highways for all trucking routes. Any trucking on Village Roads shall be reduced to arterial roadways as frequently as possible. Alterations to any approved routes shall be approved by the Engineer.

SCHEDULE: All repairs and pavement replacement shall be completed by July 31, 2023. Award of this contract is expected to occur around April 11th and the Contractor may begin work shortly thereafter.

ENGINEER: The term Engineer referred to under this contract shall be the Village Engineer, the Director of Public Services, or his authorized representative limited by the particular duties entrusted to him.

UTILITY MATERIALS: The material used for culvert installation shall be Class III or IV Reinforced Concrete Pipe (elliptical and round) with Tie Bolts and End Aprons (Flared End Sections) and shall meet WisDOT Specifications 522. Where designated, the Contractor shall use Arched Corrugated Metal Pipe with End Sections. The specific pipe material and class will vary based on the location as shown in the Appendix. The storm sewer extension pipe shall be SDR 35 or approved equal.

All back plaster / tuck point work shall also be completed using Type N Mortar.

The casting for the yard drain shall consist of a Reinforced Concrete Pipe (Class III) turned vertically with a Neenah R-4350-E Series Beehive Grate for Pipe Bell.

Fittings/couplings for farm drain connections shall be completed using FERNCO flexible couplings for either 6" or 8" Clay to PVC.

FURNISH & INSTALL CULVERT PIPE REINFORCED CONCRETE: The Contractor shall saw-cut the pavement and remove the existing CMP culvert pipe as marked in the field by the Engineer. The Village of Caledonia will provide a benchmark and cut elevations for each pipe to be replaced by the Contractor in the field. All RCP pipes shall be installed per the Standard Specifications for Sewer and Water Construction in Wisconsin and the WisDOT Standards Specifications 522. The average pipe depth from the invert elevation to the top of pavement is approximately 5.0'. Pipes under Botting Road shall be installed with washed stone bedding and cover per Standard Specifications. The Contractor shall use a Slurry Backfill for all pipes under the Road. All pipes require end aprons of matching size. The length provided on the Bid Tab includes the end aprons (4 pipes and 2 end aprons). The Contractor shall order accordingly. All RCP pipes shall be installed with tie bolting and fabric wrapped joints. Tie Bolting shall be installed per the Standard Specifications and included in the price per foot. Fabric shall be a geotextile woven fabric and approved prior to use. Concrete culverts sized 24" or greater shall require the placement of medium sized rip-rap at the end section. Rip rap shall be placed around each end section approximately with the placement of geotextile fabric below as shown on the detail sheet in the appendix. The Engineer will layout the limits of rip-rap due to Right-of-Way availability and may require alterations to the overall limits. The cost to furnish and install the rip rap and geotextile shall be included in the SY cost of "Furnish & Install Medium Rip-Rap". The cost to furnish all the material, remove the existing pipe, and install the new pipe with the necessary tools, equipment, and labor shall be included in the per foot cost for "Furnish & Install Culvert Pipe Reinforced Concrete".

FURNISH & INSTALL CORRUGATED METAL PIPE CULVERT: The Contractor shall saw-cut the pavement and remove the existing CMP culvert pipe as marked in the field by the Engineer and replaced in kind with an arched CMP as denoted on the Appendix. The Village of Caledonia will provide a benchmark and cut elevations for each pipe to be replaced by the Contractor in the field. All CMP pipes shall be installed per the Standard Specifications for Sewer and Water Construction in Wisconsin and the WisDOT Standards Specifications. Pipes along Botting Road shall be installed with washed stone bedding and cover. The Contractor shall use a Slurry Backfill for all pipes under the road. The length provided in the Bid Tab does include the end aprons. The pipes in the West Point Subdivision only need 1 end apron each as they are connected to an existing manhole. The manhole will require slight modification to accommodate the new pipe. The work required

to modify the existing concrete manhole shall be paid for under the bid item for “Core/Modify Existing Structure”. The cost to furnish the material and install the pipe with the necessary tools, equipment, and labor shall be included in the per foot cost for “Furnish & Install Culvert Pipe Arch CMP”.

FURNISH & INSTALL 12” STORM SEWER EXTENSION: The Contractor shall extend a 12” SDR 35 storm sewer pipe from the existing manhole structure to the proposed yard drain as shown on the attached plan at 4807 Alcyn Drive. This pipe is proposed to be in an area of sandy soils and shall require sand bedding and backfill per the Standard Specifications 8.43 (c). Spoil backfill will be allowed along the stretch of this pipe due to the sandy soils and its placement within an open ditch. The Contractor will be required to remove an existing 12” CMP culvert and the asphalt driveway approach it is under for the installation of this pipe. The existing culvert will not be required to be replaced and the driveway will be made a highpoint for the roadside ditch. The driveway will require slurry backfill to grade and will be paved by others at a later date. The Contractor will be required to reshape and grade the swale so that the driveway becomes a highpoint. Quality spoil material from the trenches on the adjacent culvert replacement may be used to re-shape this swale. The Contractor shall ensure that a minimum of 4” of topsoil, seed, and matting is placed in all disturbed areas of the swale. WisDOT Highway Mix 40 is an acceptable seed for the work. It is estimated that there is approximately 300 square feet of grading. The work as described above shall be included in the cost per Linear Foot of Furnish & Install 12” Storm Sewer. The cost to core into the existing structure shall be included in that specific bid item.

FURNISH & INSTALL YARD DRAIN: The yard drain consists of a section of 24” RCP pipe turned “bell side up” to act as an inlet in the locations proposed on the location map. The detail drawing attached to the Alcyn Drive work shows the cross section of the Yard Drain. The 24” Concrete pipe shall be a minimum of 30” deep, preferably 36”, and shall be installed into a sand or stone bedding, based on the location. The yard drain shall be set to the elevation as provided by the Engineer in the field and backfilled with sand spoils (Alcyn Drive) or slurry (Botting Road). The appropriate sized inlet/outlet pipe shall be cut into the side of the Yard Drain and a concrete bench shall be poured. The concrete bench/bottom may be installed utilizing a minimum 3,000 psi bag mix. The bench/bottom shall be a minimum of 5” thick and finished to promote proper drainage through the structure. The Contractor shall include the material, tools, and labor necessary to install both Yard Drains as described above in the bid item for “Furnish & Install Yard Drain”. Clearing and grubbing will be completed by the Village’s Public Works Department in advance of the Contractor performing the culvert replacement.

The Yard Drain at Botting Road will require the removal of an existing farm drain inlet structure made of brick and only 2’ deep by 2’ wide. It is located 20’ west of the east end of the proposed 45”x29” HERCP at the north end of Botting Road. This existing structure contains either an 6” or 8” farm tile that runs under the proposed culvert. This structure shall be removed in a way to save the west end of the farm tile and a new Yard Drain installed approximately 5’ west of the west end of the proposed HERCP. The new yard drain will be within the limits of the proposed rip rap. The Contractor shall include the additional removal in the cost per each Yard Drain.

REMOVE & REPLACE FARM TILE: Under the proposed 45"x29" HERCP on the northern segment of Botting Road exists a farm tile. The farm tile is believed to be a 6" or 8" clay tile running approximately 12-18" below the existing culvert. The farm tile ties into the existing field inlet as described in the Yard Drain section and continues west into the farm field. The Contractor shall over excavate the trench to under the proposed culvert and attempt to locate the exact alignment of the tile within their trench. The contractor shall saw-cut the existing tile east of the proposed end section and connect onto it with a FERNCO flexible coupling and replace it with a PVC pipe of equivalent sizing. The Contractor shall make every effort to locate the new farm tile on the outside edges of the trench to avoid placing it directly underneath the new HERCP. Once the pipe is extended beyond the Culvert, it shall be connected to the new Yard Drain. From there it shall be reconnected to the existing farm tile with another FERNCO Fitting. The contractor shall use stone bedding and backfill for the farm drain. The cost to remove and replace the existing farm tile as described, in either the 6" or 8" size, and shall be included in the per foot cost as labeled in the bid tab. The couplings shall be included in the per foot cost of the farm tile.

CORE/MODIFY EXISTING STRUCTURE: The Contractor will be required to core into an existing structure for the installation of the 12" Storm Sewer and will be required to modify an existing manhole for the 4 Arch CMP culvert installations in the West Point Subdivision. The Contractor shall achieve this through saw-cut or mechanical methods and is required to tuck-point and back plaster the structure after the work is completed upon connection. The cost to furnish all labor and material to core into and modify these structures shall be paid for under the lump sum bid item "Modify Existing Structure". The Contractor will be responsible for ascertaining the nature of this structure that is called out on the project location map.

TERRACE RESTORATION: The existing grass terrace and roadside ditches will be disturbed in locations adjacent to the culvert installation. These areas shall be restored with a minimum of 4" of **compacted** and screened top soil. The areas shall then be seeded with WisDOT Highway Mix 40 or approved equal. The seed mix shall be submitted to the Engineer for approval. All areas shall be restored to their original condition as nearly as possible. The cost to restore areas are incidental to the installation of the proposed culvert replacements and shall be included in the cost for each item, respectively.

ASPHALT PATCHING: The Contractor shall replace the asphalt in the limits of their saw-cut trenches after the slurry has finished setting. The Contractor may use this time to coordinate the work for paving all of the trench crossings and any possible road closures required to be completed for this work. The existing asphalt pavement in these areas varies from 4" to 6" in depth. The Contractor will be allowed to use a binder mix and place it in two lifts to complete the trench patch. The binder mix shall be 3 MT 58-28 S and the tickets shall be provided to the Engineer to verify the mix design. For bidding purposes, the contractor shall use the average depth of 5" for asphalt placement. The cost to furnish and place the asphalt binder trench patch shall be included in the per TON price for asphalt patch.

WORK BY OTHERS: Any clearing or grubbing work will be completed by the Village's Public Works Department, specifically on Botting Road. The driveway at 4807 Alcyn Drive will be trench patched by the Village or their paving contractor. The Contractor shall ensure a clean edge is maintained in the private driveway for the future paving work.

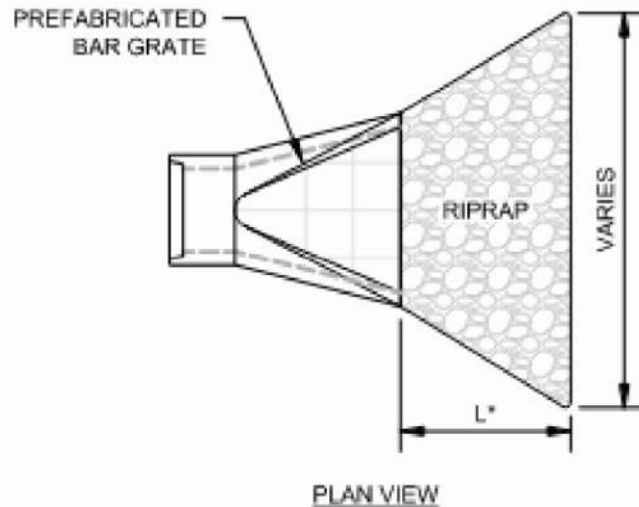
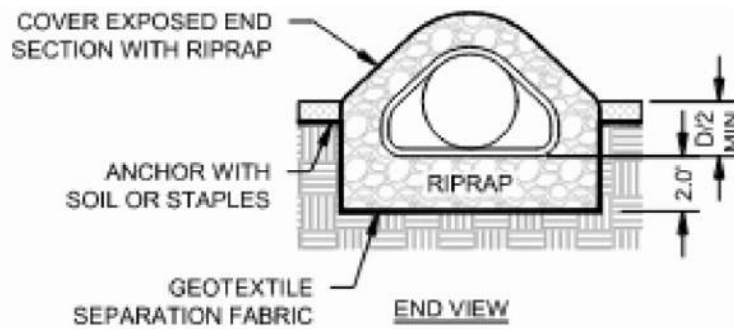
BARRICADES AND SAFETY PRECAUTIONS: The Contractor shall maintain all traffic control devices such as, barricades, flares, fences, flasher lights, flag men and all other means as are necessary and in conformance with the MUTCD for the general safety and welfare of the public during the life of the project.

PRIVATE DRIVEWAYS: Private drives and side roads shall remain open to the public. If a closure is necessary, the contractor must provide notice to the resident and to the Village three (3) days before the work will commence. The Village will notify the resident at 4807 Alcyn as soon as a schedule is provided to the Village by the Contractor.

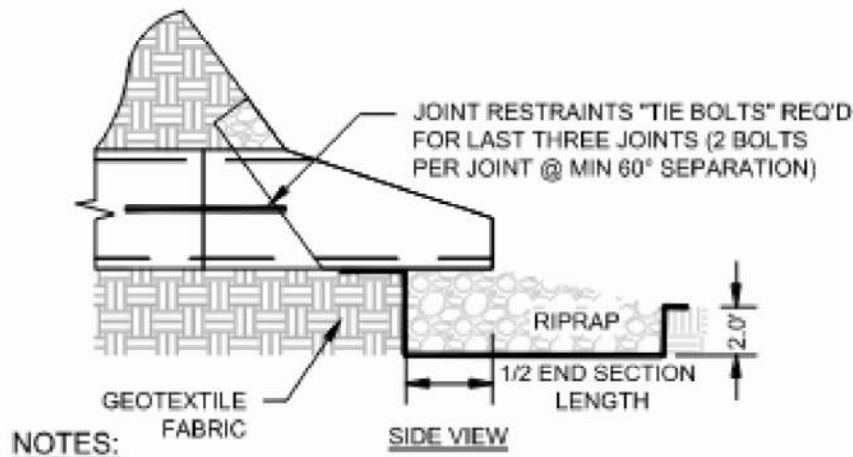
MEASUREMENT AND PAYMENT: Measurement and Payment for each item is to be broken down in each paragraph describing the work. Any payment shall include full compensation for all materials, tools, equipment and incidentals necessary to complete the work contemplated by the contract.

Payment will be made upon receipt of an invoice for the quantity of material incorporated into the work. Lien waivers and an affidavit of compliance are required with each request for payment.

APPENDIX



$L^* = 3 \text{ TIMES PIPE DIAMETER (TYP.) OR 10 FOOT MIN. OR AS DIRECTED BY THE ENGINEER}$



NOTES:

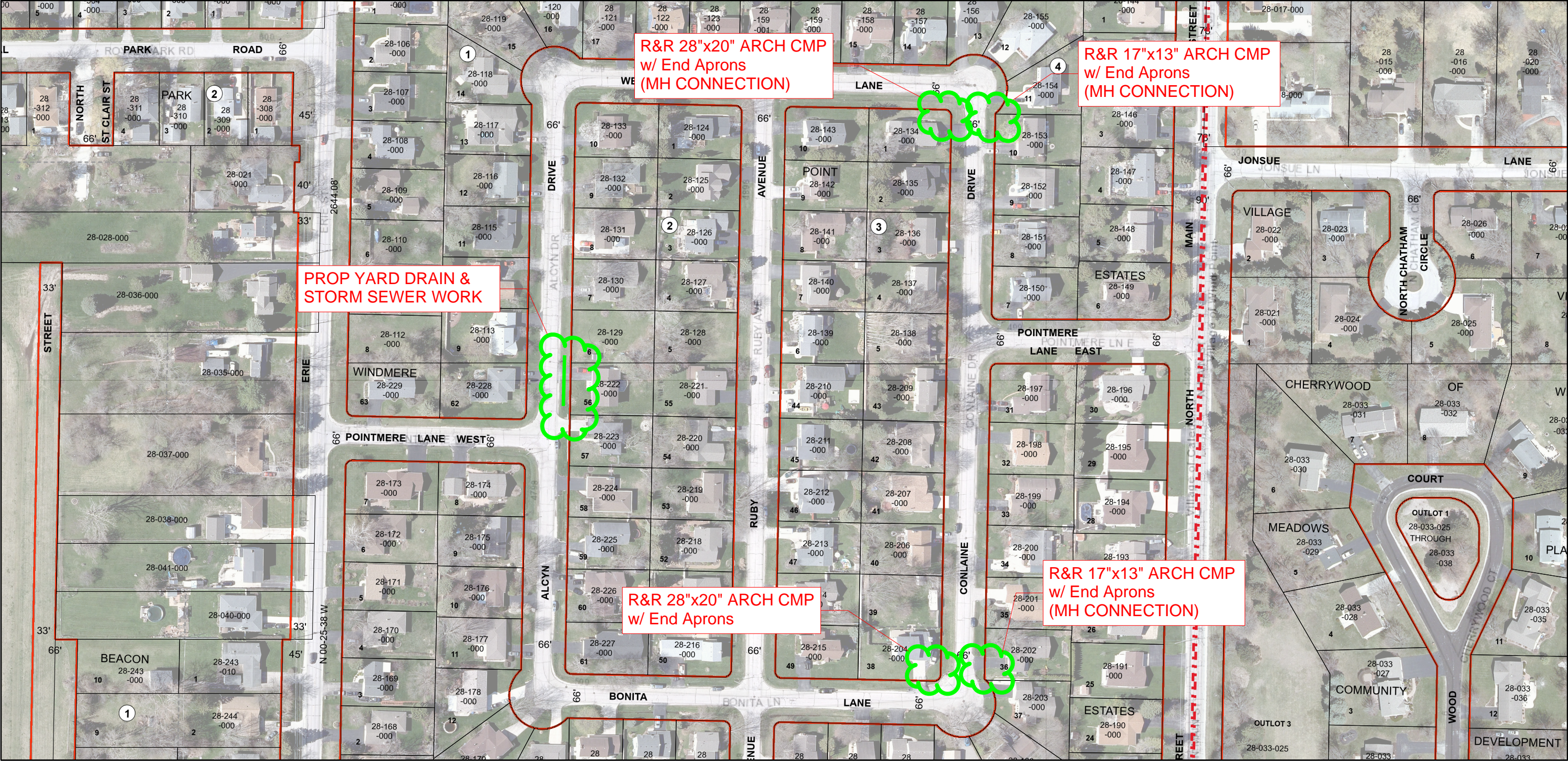
1. RIP RAP AND GEOTEXTILE FABRIC SHALL MEET REQUIREMENTS FOR STANDARD SPECIFICATIONS FOR HIGHWAY AND STRUCTURE CONSTRUCTION.

TYPICAL RIP RAP DETAIL

DRAWN BY: RMS
APPROVED BY: RMS
DATE DRAWN: 3/22/23



West Point Culvert Repairs



March 22, 2023

Tax Parcels

Parcel Tie Lines

Municipal Boundaries

Road Right of Ways

Water lines

Waterbody

2022 Spring Aerial

Red: Band_1

Green: Band_2

Blue: Band_3

00.020.040.08 mi

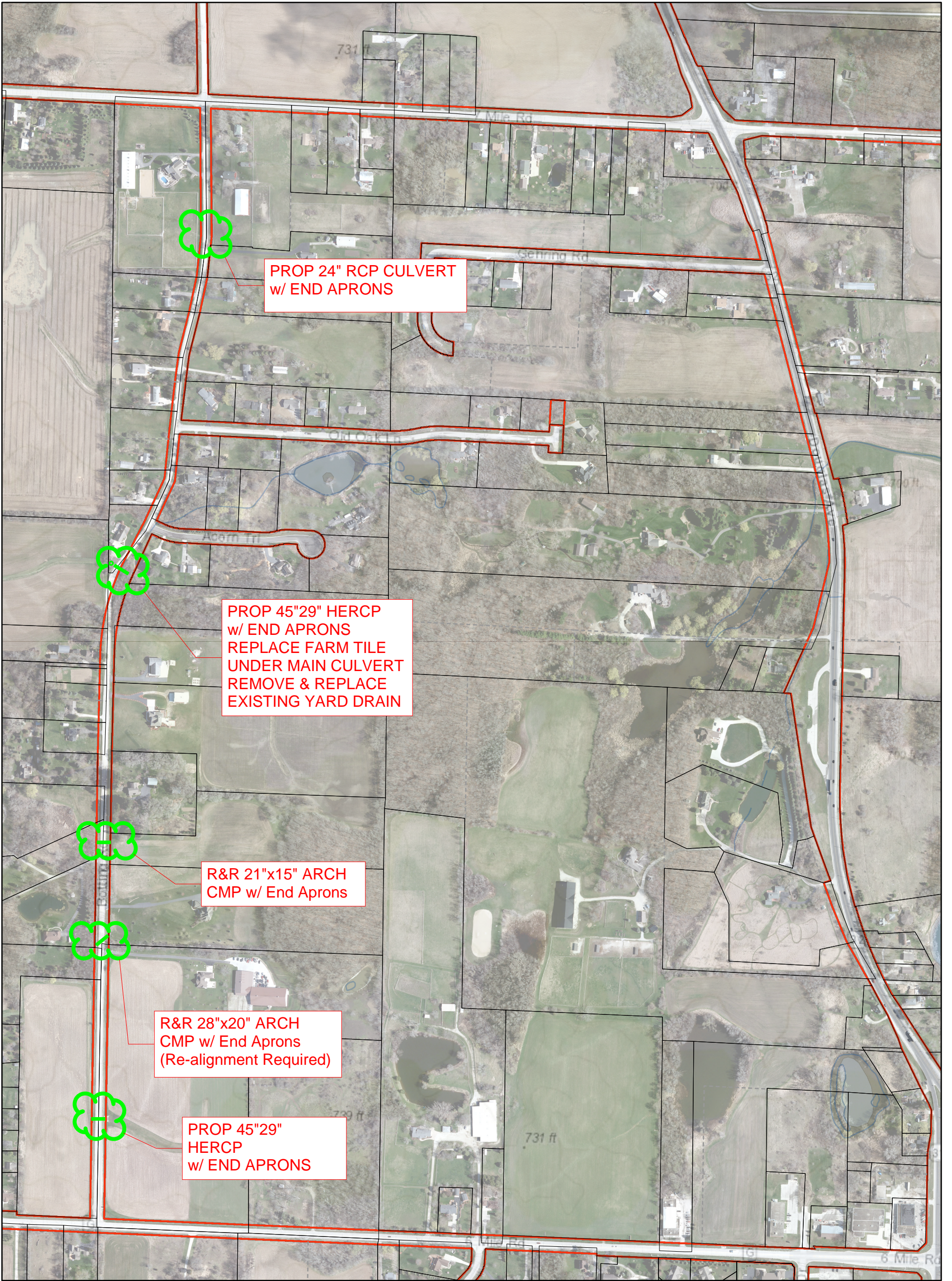
00.030.070.13 km

1:2,400

Racine County, Esri Canada, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA, Racine County, SEWRPC

ArcGIS WebApp Builder

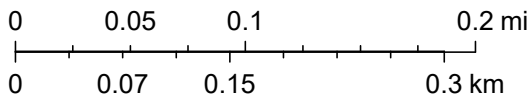
Botting Road Culvert Replacement Locations



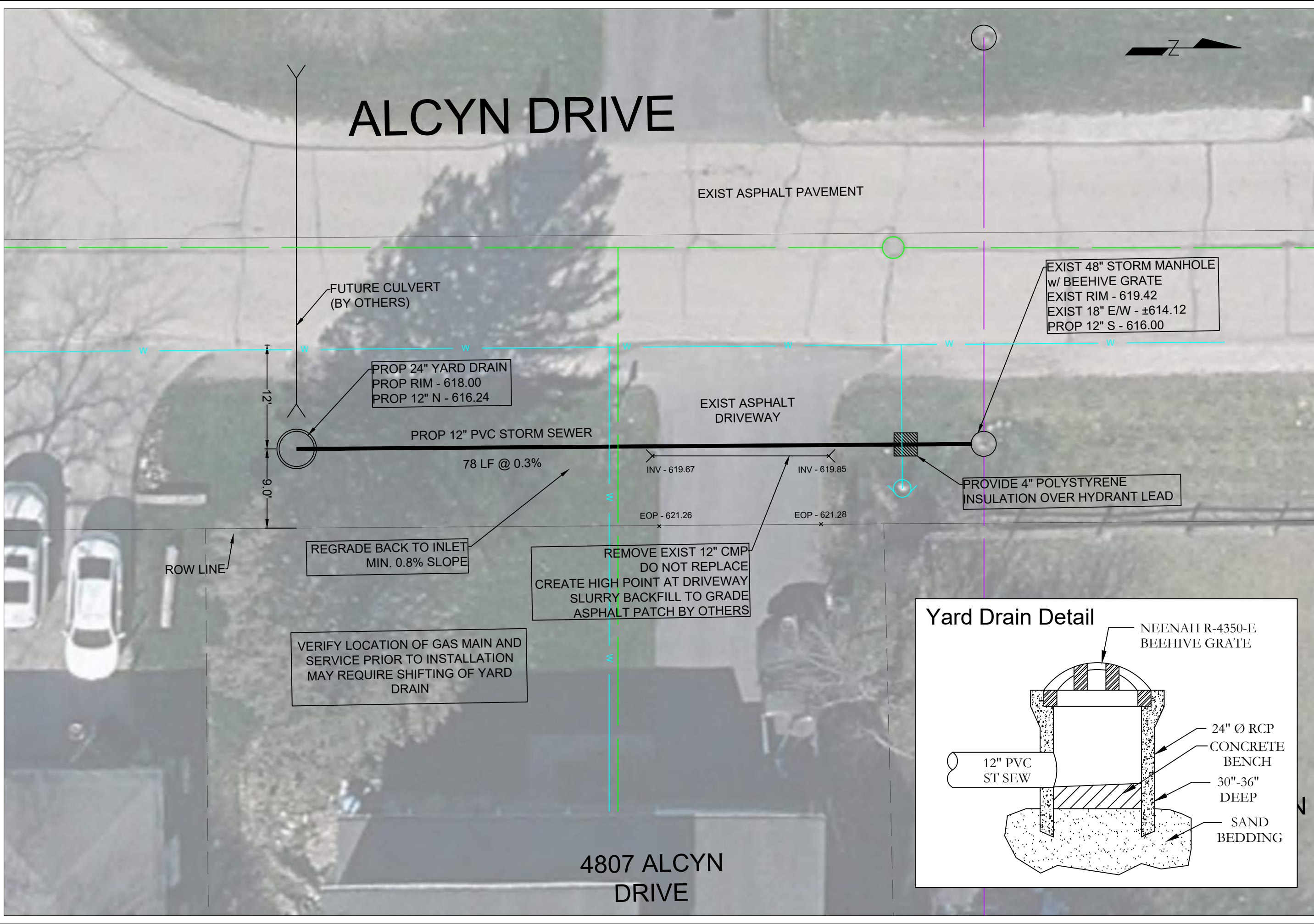
March 22, 2023

- | | | | |
|--|----------------------|---|---------------|
|  | Tax Parcels |  | Waterbody |
|  | Parcel Tie Lines | 2022 Spring Aerial | |
|  | Municipal Boundaries |  | Red: Band_1 |
|  | Road Right of Ways |  | Green: Band_2 |
|  | Water lines |  | Blue: Band_3 |

1:7,200



Racine County
Racine County, SEWRPC
Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/
NASA, EPA, USDA





DATE: 03/22/23
APPROVED BY: RMS
DRAWN BY: RMS
SCALE: 1:10 (11x17)

VILLAGE OF CALEDONIA PROJECT #2023-02

PROPOSED YARD DRAIN & STORM SEWER EXTENSION
4807 ALCYN LANE



SDD 8F1 Apron Endwalls for Culvert Pipe

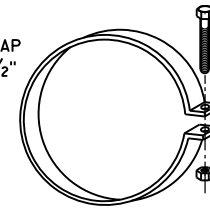
| METAL APRON ENDWALLS | | | | | | | | | | | |
|----------------------|----------------------|-------|---------------------|----------|-----------|-----------|--------|--------|---------|---------------|-------|
| PIPE DIA. (IN.) | MIN. THICK. (Inches) | | DIMENSIONS (Inches) | | | | | | | APPROX. SLOPE | BODY |
| | STEEL | ALUM. | A (±1") | B (MAX.) | H (±1/2") | L (±1/2") | L1 (1) | L2 (1) | W (±2") | | |
| 12 | .064 | .060 | 6 | 6 | 6 | 21 | 12 | 17 1/2 | 24 | 2 1/2 to 1 | 1 Pc. |
| 15 | .064 | .060 | 7 | 8 | 6 | 26 | 14 | 21 3/4 | 30 | 2 1/2 to 1 | 1 Pc. |
| 18 | .064 | .060 | 8 | 10 | 6 | 31 | 15 | 28 1/4 | 36 | 2 1/2 to 1 | 1 Pc. |
| 21 | .064 | .060 | 9 | 12 | 6 | 36 | 18 | 29 5/8 | 42 | 2 1/2 to 1 | 1 Pc. |
| 24 | .064 | .075 | 10 | 13 | 6 | 41 | 18 | 37 1/4 | 48 | 2 1/2 to 1 | 1 Pc. |
| 30 | .079 | .075 | 12 | 16 | 8 | 51 | 18 | 52 1/4 | 60 | 2 1/2 to 1 | 1 Pc. |
| 36 | .079 | .105 | 14 | 19 | 9 | 60 | 24 | 59 3/4 | 72 | 2 1/2 to 1 | 2 Pc. |
| 42 | .109 | .105 | 16 | 22 | 11 | 69 | 24 | 75 5/8 | 84 | 2 1/2 to 1 | 2 Pc. |
| 48 | .109 | .105 | 18 | 27 | 12 | 78 | 24 | 81 | 90 | 2 1/4 to 1 | 3 Pc. |
| 54 | .109 | .105 | 18 | 30 | 12 | 84 | 30 | 85 1/2 | 102 | 2 1/4 to 1 | 3 Pc. |
| 60 | .109x | .105x | 18 | 33 | 12 | 87 | — | — | 114 | 2 to 1 | 3 Pc. |
| 66 | .109x | .105x | 18 | 36 | 12 | 87 | — | — | 120 | 2 to 1 | 3 Pc. |
| 72 | .109x | .105x | 18 | 39 | 12 | 87 | — | — | 126 | 2 to 1 | 3 Pc. |
| 78 | .109x | .105x | 18 | 42 | 12 | 87 | — | — | 132 | 1 1/2 to 1 | 3 Pc. |
| 84 | .109x | .105x | 18 | 45 | 12 | 87 | — | — | 138 | 1 1/2 to 1 | 3 Pc. |
| 90 | .109x | .105x | 18 | 37 | 12 | 87 | — | — | 144 | 1 1/2 to 1 | 3 Pc. |
| 96 | .109x | .105x | 18 | 35 | 12 | 87 | — | — | 150 | 1 1/2 to 1 | 3 Pc. |

* EXCEPT CENTER PANEL
SEE GENERAL NOTES

| REINFORCED CONCRETE APRON ENDWALLS | | | | | | | | | | | |
|------------------------------------|---------------------|--------|--------|-----------|------------|-----|-------|---------------|--|--|--|
| PIPE DIA. (IN.) | DIMENSIONS (Inches) | | | | | | | APPROX. SLOPE | | | |
| | T | A | B | C | D | E | G | | | | |
| 12 | 2 | 4 | 24 | 48 1/8 | 72 1/8 | 24 | 2 | 3 to 1 | | | |
| 15 | 2 1/4 | 6 | 27 | 46 | 73 | 30 | 2 1/4 | 3 to 1 | | | |
| 18 | 2 1/2 | 9 | 27 | 46 | 73 | 36 | 2 1/2 | 3 to 1 | | | |
| 21 | 2 3/4 | 9 | 36 | 37 1/2 | 73 1/2 | 42 | 2 3/4 | 3 to 1 | | | |
| 24 | 3 | 9 1/2 | 43 1/2 | 30 | 73 1/2 | 48 | 3 | 3 to 1 | | | |
| 27 | 3 1/4 | 10 1/2 | 49 1/2 | 24 | 73 1/2 | 54 | 3 1/4 | 3 to 1 | | | |
| 30 | 3 1/2 | 12 | 54 | 19 3/4 | 73 1/2 | 60 | 3 1/2 | 3 to 1 | | | |
| 36 | 4 | 15 | 63 | 34 3/4 | 97 3/4 | 72 | 4 | 3 to 1 | | | |
| 42 | 4 1/2 | 21 | 63 | 35 | 98 | 78 | 4 1/2 | 3 to 1 | | | |
| 48 | 5 | 24 | 72 | 26 | 98 | 84 | 5 | 3 to 1 | | | |
| 54 | 5 1/2 | 27 | 65 | 33 1/4-35 | 98 1/4-100 | 90 | 5 1/2 | 2 1/2 to 1 | | | |
| 60 | 6 | 30-35 | 60 | 39 | 99 | 96 | 5 | 2 to 1 | | | |
| 66 | 6 1/2 | 34-30 | 72-78 | 21-27 | 99 | 102 | 5 1/2 | 2 to 1 | | | |
| 72 | 7 | 34-36 | 78 | 21 | 99 | 108 | 6 | 2 to 1 | | | |
| 78 | 7 1/2 | 34-36 | 78 | 21 | 99 | 114 | 6 1/2 | 2 to 1 | | | |
| 84 | 8 | 36 | 90 1/2 | 21 | 111 1/2 | 120 | 6 1/2 | 1 1/2 to 1 | | | |
| 90 | 8 1/2 | 41 | 87 1/2 | 24 | 111 1/2 | 132 | 6 1/2 | 1 1/2 to 1 | | | |

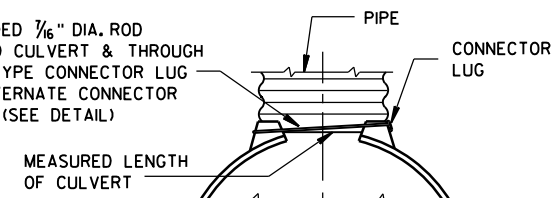
* MINIMUM
** MAXIMUM

1" WIDE, 12 GA. (0.109" THICK) GALVANIZED STRAP WITH STANDARD 6" X 1/2" BAND BOLT AND NUT



ALTERNATE FOR TYPE 1 CONNECTION
END SECTION CONNECTOR STRAP

THREADED 1/6" DIA. ROD AROUND CULVERT & THROUGH TANK TYPE CONNECTOR LUG OR ALTERNATE CONNECTOR STRAP (SEE DETAIL)



TYPE 1
FOR 12" THRU 24" CORR. PIPE

THREADED 1/6" DIA. ROD OVER TOP OF APRON, SIDE LUGS TO BE RIVETED TO APRON



TYPE 2
FOR 30" THRU 96" CORR. PIPE

MEASURED LENGTH OF CULVERT

CONNECTOR SECTION TO BE PAID FOR AS PART OF END SECTION

TYPE 3
FOR 42" THRU 96" CORR. PIPE

DIMPLED OR CORRUGATED COUPLING BAND

RIVETED OR BOLTED AT DIMPLES (6" C-C FOR CORRUGATED BAND)

TYPE 5
ALTERNATE FOR:
ALL SIZES CORRUGATED CIRCULAR PIPE

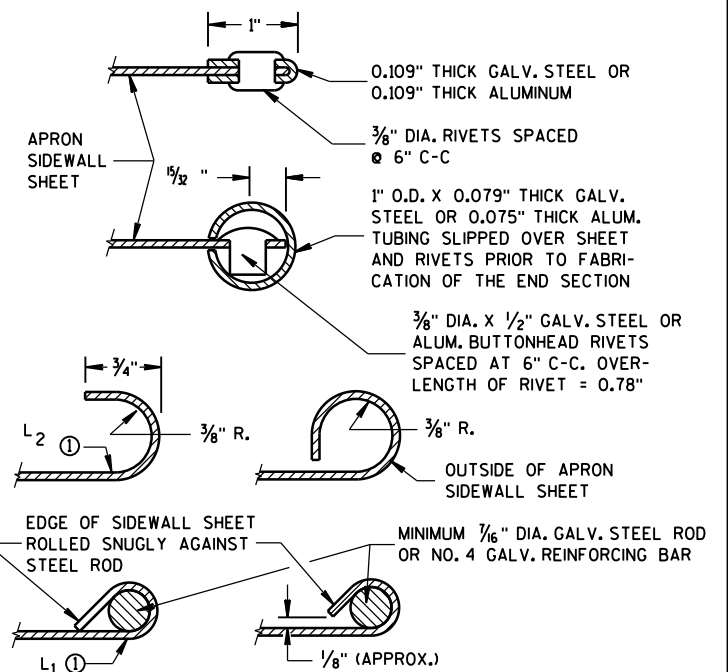
NOTE: DIMPLED BAND FITS OVER OUTSIDE OF ENDWALL, AND CORRUGATED BAND FITS INSIDE ENDWALL. DIMPLED BAND MAY BE USED WITH HELICALLY CORRUGATED PIPE.

FOR CIRCUMFERENTIALLY CORRUGATED PIPE USE ENDWALL CONNECTION DETAILS 1, 2, 3 OR 5 AS APPLICABLE.

FOR HELICALLY CORRUGATED PIPE USE ENDWALL CONNECTION DETAILS 1, 2 OR 5.

FOR HELICALLY CORRUGATED PIPES WITH TWO CIRCUMFERENTIAL CORRUGATIONS AT EACH END USE ENDWALL CONNECTION DETAILS 1, 2 OR 3.

CONNECTION DETAILS



SECTION A-A

GENERAL NOTES

DETAILS OF CONSTRUCTION, MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.

CONCRETE CULVERT ENDWALLS MAY NOT BE USED WITH GALVANIZED STEEL OR ALUMINUM CULVERT PIPE OR VISE VERSA. GALVANIZED STEEL OR ALUMINUM ENDWALLS SHALL NORMALLY BE INSTALLED ON CULVERT PIPE OF THE SAME METAL.

ALL THREE PIECE STEEL APRON ENDWALLS FOR 60" DIAMETER PIPE AND LARGER SHALL HAVE 0.109" SIDES AND 0.138" CENTER PANELS. ALL THREE PIECE ALUMINUM APRON ENDWALLS FOR 60" DIAMETER PIPE AND LARGER SHALL HAVE 0.105" SIDES AND 0.134" CENTER PANELS. THE WIDTH OF CENTER PANELS SHALL BE GREATER THAN 20 PERCENT OF THE PIPE PERIMETER.

LAP SEAMS SHALL BE TIGHTLY JOINED BY GALVANIZED RIVETS OR BOLTS FOR STEEL UNITS AND ALUMINUM RIVETS AND BOLTS FOR ALUMINUM UNITS. FOR THE 60" THROUGH 96" DIAMETER APRON ENDWALL SIZES, THE REINFORCED EDGES AND CENTER PANEL SEAMS SHALL BE FURTHER REINFORCED WITH GALVANIZED STEEL OR ALUMINUM STIFFENER ANGLES. THE ANGLES SHALL BE ATTACHED BY GALVANIZED NUTS AND BOLTS FOR STEEL UNITS AND ALUMINUM NUTS AND BOLTS FOR ALUMINUM UNITS.

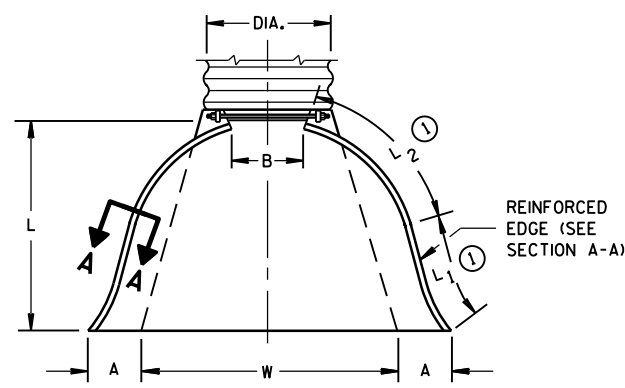
WHERE TWO OR MORE PIPES WITH APRON ENDWALLS ARE LAID ADJACENT TO EACH OTHER, THEY SHALL BE SEPARATED BY A DISTANCE SUFFICIENT TO PROVIDE A MINIMUM CLEARANCE OF 6 INCHES BETWEEN APRON ENDWALLS.

① FOR PIPE SIZES UP TO 60" DIAMETER, A 180° ROLLED EDGE MAY BE USED INSTEAD OF STEEL ROD REINFORCEMENT. SEE SECTION A-A.

APRON ENDWALLS FOR CULVERT PIPE

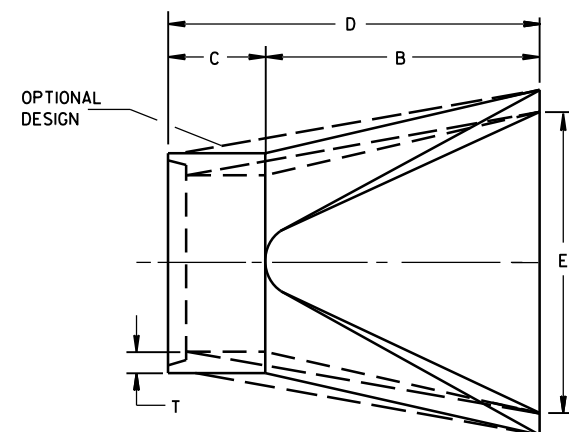
STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

APPROVED
8-30-94
DATE
/S/ Rory L. Rhinesmith
CHIEF ROADWAY DEVELOPMENT ENGINEER
FHWA

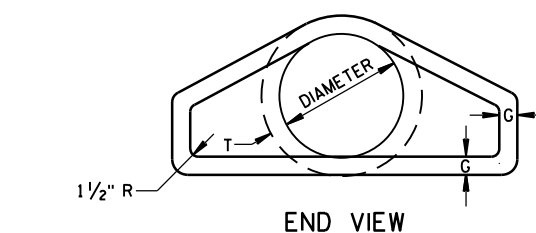


PLAN VIEW

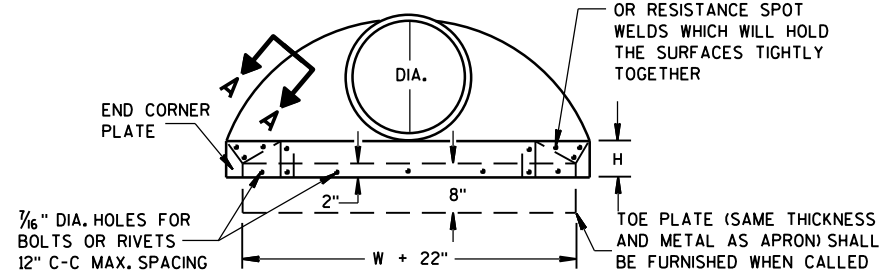
REINFORCED EDGE (SEE SECTION A-A)



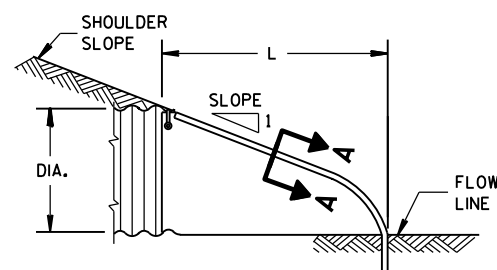
PLAN



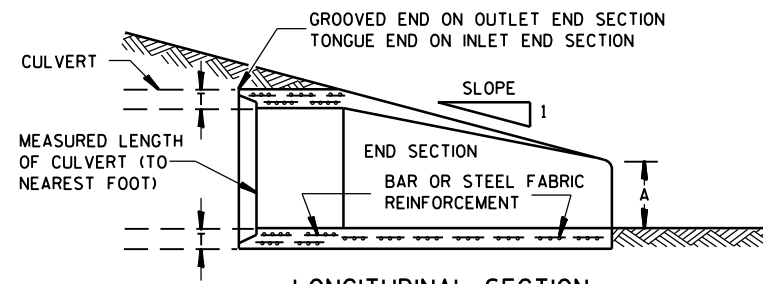
END VIEW



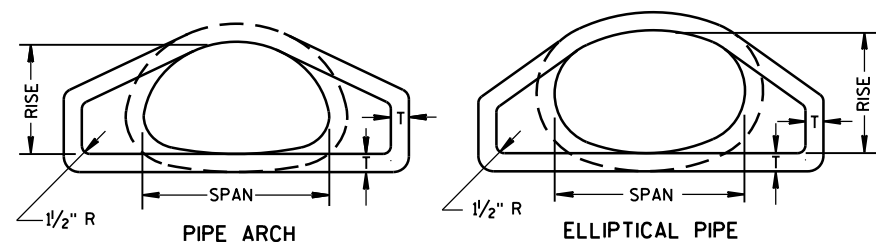
END VIEW



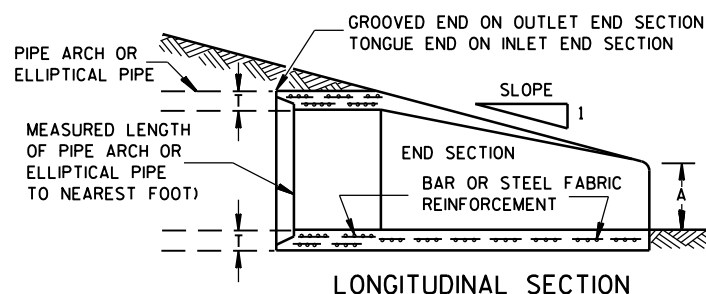
SIDE ELEVATION
METAL ENDWALLS



LONGITUDINAL SECTION
CONCRETE ENDWALLS

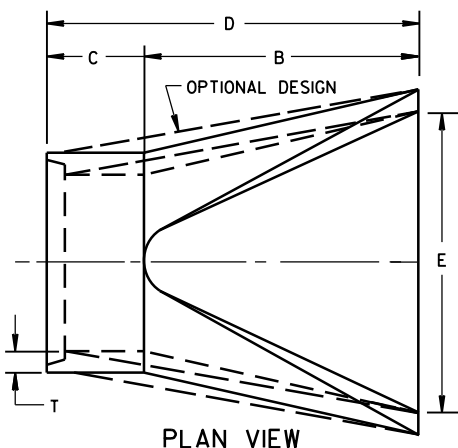


END VIEW



LONGITUDINAL SECTION

CONCRETE ENDWALLS



PLAN VIEW

| 2- 2 3/8" x 1/2" CORRUGATIONS | | | | | | | | | | | | |
|-------------------------------|----------|------|----------------------|-------|---------------------|----------|---------|-------------|------|--------|---------|---------------|
| EQUIV. DIA. (Inches) | (Inches) | | MIN. THICK. (Inches) | | DIMENSIONS (Inches) | | | | | | | APPROX. SLOPE |
| | SPAN | RISE | STEEL | ALUM. | A (±1") | B (MAX.) | H (±1") | L (±1 1/2") | L1 ① | L2 ① | W (±2") | |
| 15 | 17 | 13 | .064 | .060 | 7 | 9 | 6 | 19 | 14 | 16 | 30 | 2 1/2 to 1 |
| 18 | 21 | 15 | .064 | .060 | 7 | 10 | 6 | 23 | 14 | 19 3/8 | 36 | 2 1/2 to 1 |
| 21 | 24 | 18 | .064 | .060 | 8 | 12 | 6 | 28 | 18 | 21 3/4 | 42 | 2 1/2 to 1 |
| 24 | 28 | 20 | .064 | .060 | 9 | 14 | 6 | 32 | 18 | 27 1/2 | 48 | 2 1/2 to 1 |
| 30 | 35 | 24 | .079 | .075 | 10 | 16 | 6 | 39 | 18 | 37 3/8 | 60 | 2 1/2 to 1 |
| 36 | 42 | 29 | .079 | .075 | 12 | 18 | 8 | 46 | 24 | 45 3/8 | 75 | 2 1/2 to 1 |
| 42 | 49 | 33 | .109 | .105 | 13 | 21 | 9 | 53 | 24 | 54 3/4 | 85 | 2 1/2 to 1 |
| 48 | 57 | 38 | .109 | .105 | 18 | 26 | 12 | 63 | 24 | 68 | 90 | 2 1/2 to 1 |
| 54 | 64 | 43 | .109 | .105 | 18 | 30 | 12 | 70 | 24 | 72 3/4 | 102 | 2 1/4 to 1 |
| 60 | 71 | 47 | .109* | .105* | 18 | 33 | 12 | 77 | 30 | 82 1/4 | 114 | 2 1/4 to 1 |
| 66 | 77 | 52 | .109* | .105* | 18 | 36 | 12 | 77 | — | — | 126 | 2 to 1 |
| 72 | 83 | 57 | .109* | .105* | 18 | 39 | 12 | 77 | — | — | 138 | 2 to 1 |

| 3" X 1" CORRUGATIONS | | | | | | | | | | | | |
|----------------------|----------|------|----------------------|-------|---------------------|----------|---------|-------------|------|--------|---------|---------------|
| EQUIV. DIA. (Inches) | (Inches) | | MIN. THICK. (Inches) | | DIMENSIONS (Inches) | | | | | | | APPROX. SLOPE |
| | SPAN | RISE | STEEL | ALUM. | A (±1") | B (MAX.) | H (±1") | L (±1 1/2") | L1 ① | L2 ① | W (±2") | |
| 48 | 53 | 41 | .109 | .105 | 18 | 26 | 12 | 63 | 24 | 72 3/4 | 90 | 2 1/2 to 1 |
| 54 | 60 | 46 | .109 | .105 | 18 | 30 | 12 | 70 | 30 | 82 1/4 | 102 | 2 to 1 |
| 60 | 66 | 51 | .109* | .105* | 18 | 33 | 12 | 77 | — | — | 114 | 1 1/2 to 1 |
| 66 | 73 | 55 | .109* | .105* | 18 | 36 | 12 | 77 | — | — | 126 | 1 1/2 to 1 |
| 72 | 81 | 59 | .109* | .105* | 18 | 39 | 12 | 77 | — | — | 138 | 2 to 1 |
| 78 | 87 | 63 | .109* | .105* | 22 | 38 | 12 | 77 | — | — | 148 | 1 1/2 to 1 |
| 84 | 95 | 67 | .109* | .105* | 22 | 34 | 12 | 77 | — | — | 162 | 1 1/2 to 1 |
| 90 | 103 | 71 | .109* | .105* | 22 | 38 | 12 | 77 | — | — | 174 | 1 1/2 to 1 |
| 96 | 112 | 75 | .109* | .105* | 24 | 40 | 12 | 77 | — | — | 174 | 1 1/2 to 1 |

NOTE: ALL SPLICES TO BE LAP RIVETED OR BOLTED.

* EXCEPT CENTER PANEL SEE GENERAL NOTES

| REINFORCED CONCRETE PIPE ARCH | | | | | | | | | |
|-------------------------------|---------------------|---------|----|-----|----|----|-----|------------------|--------|
| EQUIV. DIA. (Inches) | DIMENSIONS (Inches) | | | | | | | APPROX. SLOPE | |
| | ** SPAN | ** RISE | T | A | B | C | D | | E |
| 24 | 29 | 18 | 3 | 8½ | 39 | 33 | 72 | 48 | 3 to 1 |
| 30 | 36 | 22 | 3½ | 9½ | 50 | 46 | 96 | 60 | 3 to 1 |
| 36 | 44 | 27 | 4 | 11⅞ | 60 | 36 | 96 | 72 | 3 to 1 |
| 42 | 51 | 31 | 4½ | 15⅞ | 60 | 36 | 96 | 78 | 3 to 1 |
| 48 | 58 | 36 | 5 | 21 | 60 | 36 | 96 | 84 | 3 to 1 |
| 54 | 65 | 40 | 5½ | 25½ | 60 | 36 | 96 | 90 | 3 to 1 |
| 60 | 73 | 45 | 6 | 31 | 60 | 36 | 96 | 96 | 3 to 1 |
| 72 | 88 | 54 | 7 | 31 | 60 | 39 | 99 | 120 | 2 to 1 |
| 84 | 102 | 62 | 8 | 28½ | 83 | 19 | 102 | 144 | 2 to 1 |

| REINFORCED CONCRETE ELLIPTICAL PIPE | | | | | | | | | |
|-------------------------------------|---------------------|------------|----|-----|----|----|----|-----------------|---------|
| EQUIV. DIA. (Inches) | DIMENSIONS (Inches) | | | | | | | APPROX SLOPE | |
| | ** SPAN | ** RISE | T | A | B | C | D | | E |
| 24 | 30 | 19 | 3¼ | 8½ | 39 | 33 | 72 | 48 | 3 to 0 |
| 30 | 38 | 24 | 3¾ | 9½ | 54 | 18 | 72 | 60 | 3 to 0 |
| 36 | 45 | 29 | 4½ | 11⅞ | 60 | 24 | 84 | 72 | 2½ to 0 |
| 42 | 53 | 34 | 5 | 15¾ | 60 | 36 | 96 | 78 | 2½ to 0 |
| 48 | 60 | 38 | 5½ | 21 | 60 | 36 | 96 | 84 | 2½ to 0 |
| 54 | 68 | 43 | 6 | 25½ | 60 | 36 | 96 | 90 | 2½ to 0 |
| 60 | 76 | 48 | 6½ | 30 | 60 | 36 | 96 | 96 | 2½ to 0 |

**NOMINAL SIZE

GENERAL NOTES

DETAILS OF CONSTRUCTION, MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.

CONCRETE APRON ENDWALLS MAY NOT BE USED WITH GALVANIZED STEEL OR ALUMINUM CULVERT PIPE OR VISE VERSA. GALVANIZED STEEL OR ALUMINUM APRON ENDWALLS SHALL NORMALLY BE INSTALLED ON CULVERT PIPE OF THE SAME METAL.

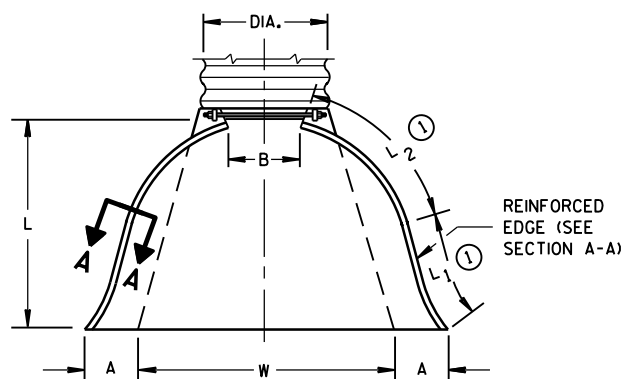
ALL THREE PIECE STEEL APRON ENDWALLS FOR 66" X 51" PIPE ARCH AND LARGER SHALL HAVE 0.109" SIDES AND 0.138" CENTER PANELS. ALL THREE PIECE ALUMINUM APRON ENDWALLS FOR 66" X 51" PIPE ARCH AND LARGER SHALL HAVE 0.105" SIDES AND 0.134" CENTER PANELS. THE WIDTH OF CENTER PANELS SHALL BE GREATER THAN 20 PERCENT OF THE PIPE ARCH PERIMETER.

LAP SEAMS SHALL BE TIGHTLY JOINED BY GALVANIZED RIVETS OR BOLTS FOR STEEL UNITS AND ALUMINUM RIVETS AND BOLTS FOR ALUMINUM UNITS. FOR THE 77" X 52" THROUGH 112" X 75" APRON ENDWALL SIZES, THE REINFORCED EDGES AND CENTER PANEL SEAMS SHALL BE FURTHER REINFORCED WITH GALVANIZED STEEL OR ALUMINUM STIFFENER ANGLES. THE ANGLES SHALL BE ATTACHED BY GALVANIZED NUTS AND BOLTS FOR STEEL UNITS AND ALUMINUM NUTS AND BOLTS FOR ALUMINUM UNITS.

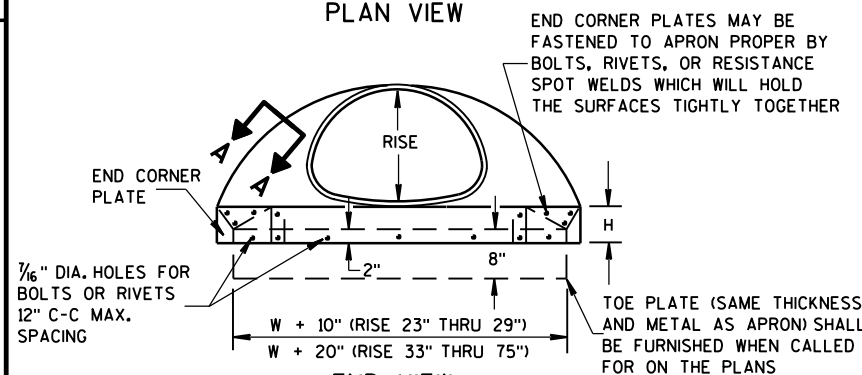
WHERE TWO OR MORE PIPES WITH APRON ENDWALLS ARE LAID ADJACENT TO EACH OTHER, THEY SHALL BE SEPARATED BY A DISTANCE SUFFICIENT TO PROVIDE A MINIMUM CLEARANCE OF 6 INCHES BETWEEN APRON ENDWALLS.

① FOR PIPE ARCH SIZES UP TO 73" X 55" A 180° ROLLED EDGE MAY BE USED INSTEAD OF STEEL ROD REINFORCEMENT. SEE SECTION A-A.

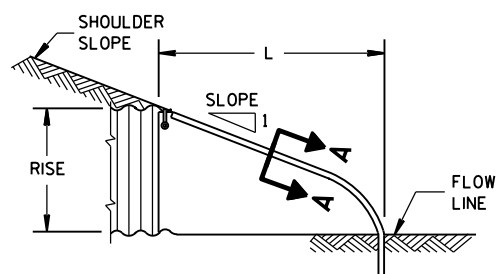
6



PLAN VIEW

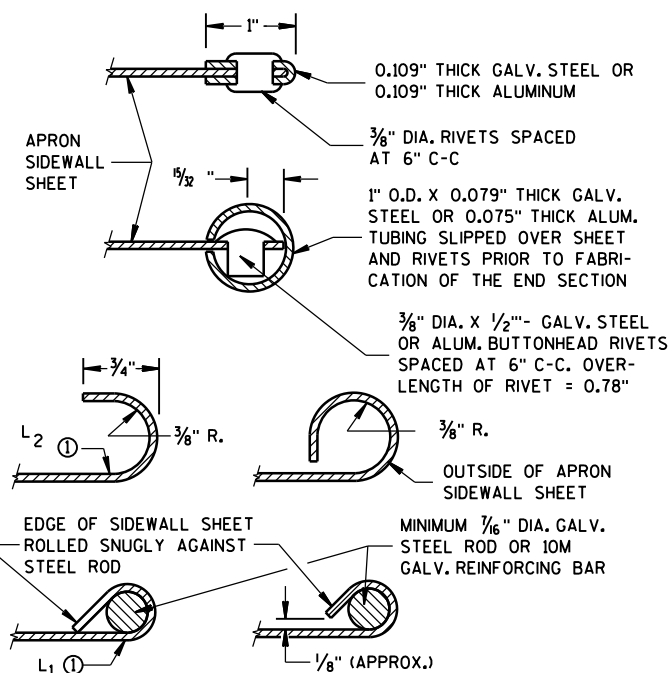


END VIEW



SIDE ELEVATION

METAL ENDWALLS

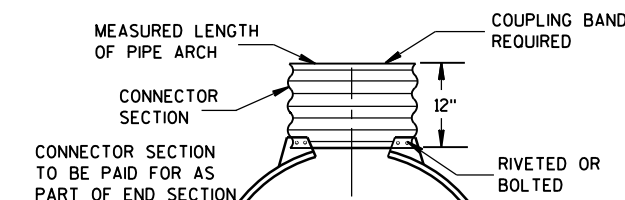


SECTION A-A



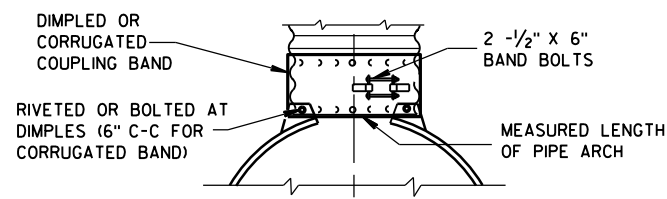
TYPE 2

FOR 17" X 13" THRU 112" X 75" PIPE ARCH



TYPE 3

FOR 64" X 43" THRU 112" X 75" PIPE ARCH



TYPE 5

ALTERNATE FOR:
ALL SIZES CORRUGATED PIPE ARCHES

NOTE: DIMPLED BAND FITS OVER OUTSIDE OF ENDWALL, AND CORRUGATED BAND FITS INSIDE ENDWALL.

CONNECTION DETAILS

APRON ENDWALLS FOR
PIPE ARCH AND
ELLIPTICAL PIPE

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

APPROVED

11-30-94

DATE

FHWA

/S/ Rory L. Rhinesmith
CHIEF ROADWAY DEVELOPMENT ENGINEER

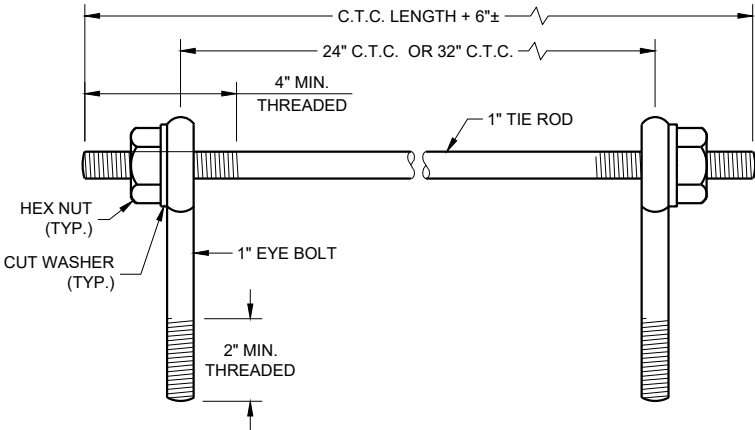
6

S.D.D. 8 F 2-1

S.D.D. 8 F 2-1

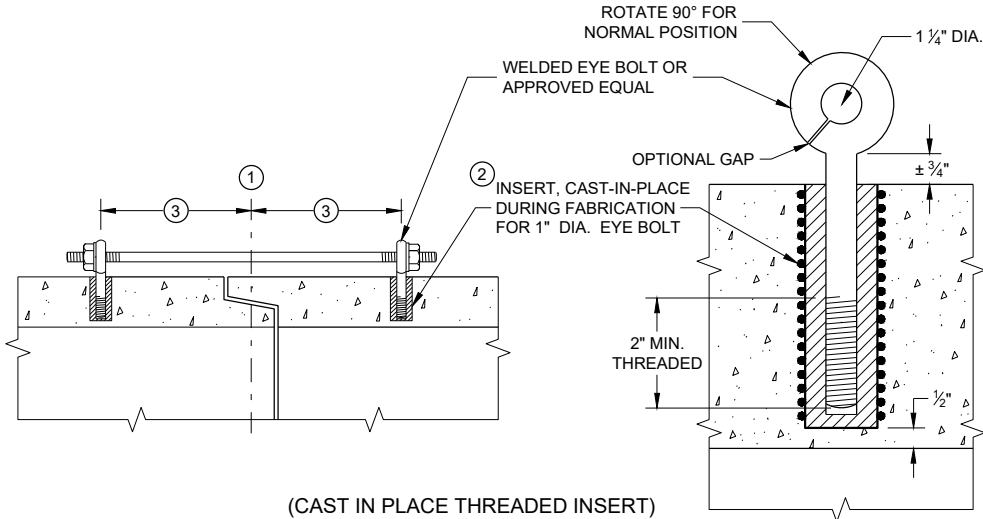


SDD 08F04 Joint Ties for Concrete Pipe and Concrete Collar Detail



EYE BOLTS AND TIE ROD

EYE BOLT AND TIE ROD ASSEMBLY (ALTERNATE NO. 1)



(CAST IN PLACE THREADED INSERT)

LONGITUDINAL SECTIONS

GENERAL NOTES

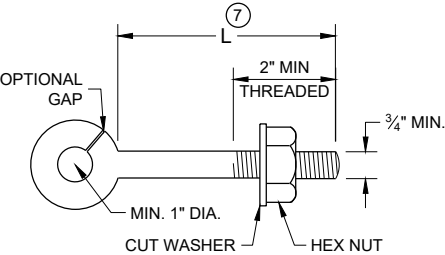
DETAILS OF CONSTRUCTION, MATERIALS, AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND APPLICABLE SPECIAL PROVISIONS.

CONCRETE CULVERT AND STORM SEWER PIPE SHALL BE TIED TOGETHER IN THE MANNER ILLUSTRATED BY THIS DETAIL AT LOCATIONS DESIGNATED IN THE STANDARD SPECIFICATIONS AND THE PLAN. THE CONTRACTOR MAY USE EITHER ALTERNATE 1, 2 OR 3 FOR DRAINAGE STRUCTURES. ONLY ALTERNATE 1 AND 3 MAY BE USED FOR CATTLE PASSES, UNLESS OTHERWISE STATED IN THE CONTRACT. THE MATERIALS, FABRICATION AND WORK NECESSARY TO TIE THE PIPE BY THIS DETAIL WILL BE CONSIDERED INCIDENTAL TO THE PIPE AND APRON ENDWALLS IF REQUIRED.

DETAILED DRAWINGS FOR PROPOSED ALTERNATE DESIGNS FOR JOINT TIES SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

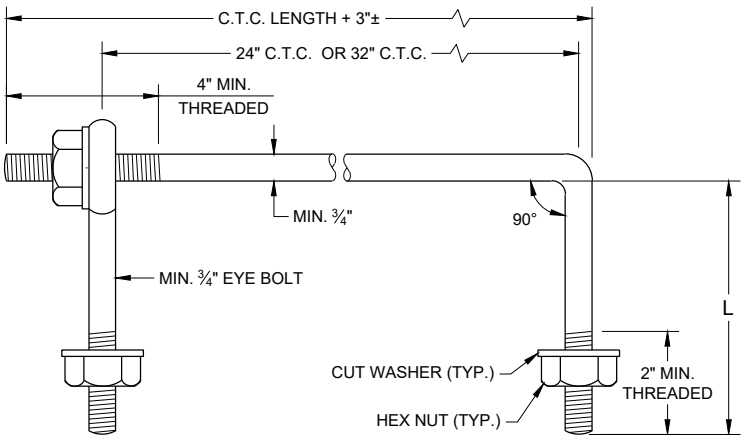
JOINT TIES TO BE HOT-DIP GALVANIZED PER ASTM A 153.

- 1 CENTER LINE OF TONGUE AND GROOVE OR BELL AND SPIGOT JOINTS.
- 2 THE INSIDE OF THE THREADED INSERTS SHALL BE CLEAN TO ALLOW THE INSERTION OF THREADED EYE BOLTS.
- 3 HOLES SHALL BE CAST-IN-PLACE OR DRILLED PER THE APPLICABLE DETAIL, AND EQUAL DISTANCE FROM THE CENTERLINE OF THE JOINT.
- 4 BOLT PROJECTION INSIDE OF PIPE SHALL NOT EXCEED 2 INCHES.
- 5 OPENING TO BE ROD DIAMETER PLUS 1 INCH.
- 6 LENGTH ADEQUATE TO EXTEND TO WITHIN 1/2 INCH OF THE INNER SURFACE OF THE PIPE.
- 7 EYE BOLT LENGTH DETERMINED BY WALL THICKNESS, BELL THICKNESS AND BOLT PROJECTION INSIDE PIPE.

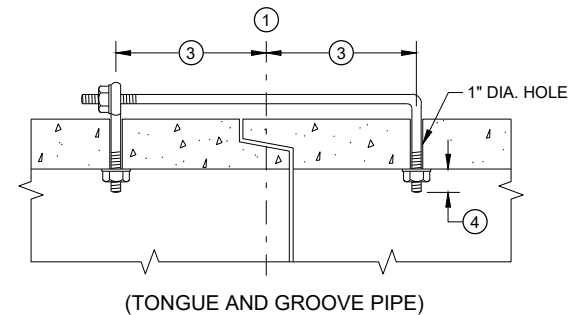


EYE BOLT 7

NOTE: TWO EYE BOLTS MAY BE USED WITH A 30" OR 38" LONG THREADED ROD IN LIEU OF THE 90° BENT TIE ROD.



EYE BOLT AND TIE ROD

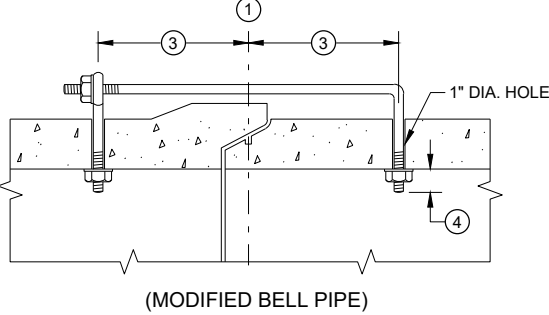


(TONGUE AND GROOVE PIPE)

LONGITUDINAL SECTION

(JOINT TIES FOR 18" TO 66" DIA. CONCRETE PIPE)

EYE BOLT AND TIE ROD ASSEMBLY (ALTERNATE NO. 2)

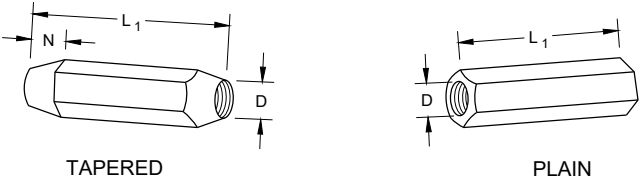


(MODIFIED BELL PIPE)

ADJUSTABLE TIE ROD TABLE

| PIPE DIAMETER | TIE ROD DIAMETER | D | L ₁ | N |
|---------------|------------------|-----|----------------|--------|
| 12 - 60 | 5/8 | 5/8 | 5 | 1/2 |
| 66 - 84 | 3/4 | 3/4 | 5 | 1/2 |
| 90 - 144 | 1 | 1 | 7 | 1 1/16 |

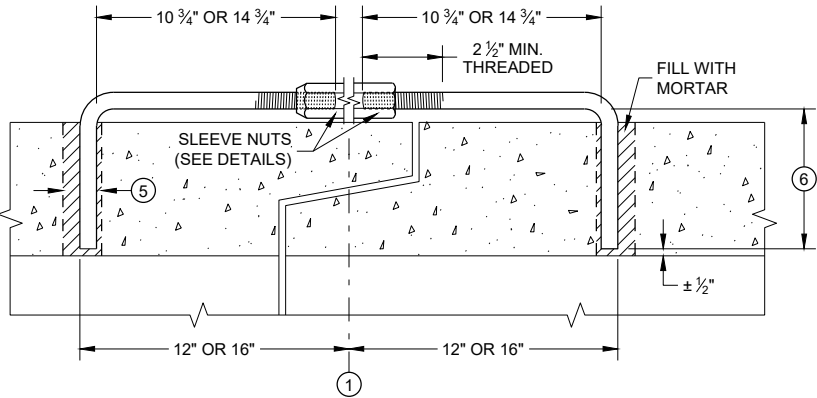
DIMENSIONS SHOWN ARE IN INCHES



TAPERED

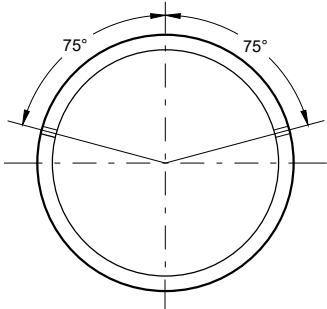
PLAIN

RIGHT AND LEFT THREADS
SLEEVE NUTS



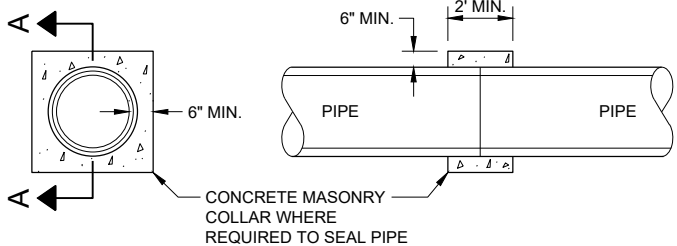
LONGITUDINAL SECTION

ADJUSTABLE TIE ROD (ALTERNATE NO. 3)



PLACEMENT OF (2) CAST-IN-PLACE INSERTS OR HOLES DURING FABRICATION FOR PIPE SECTIONS REQUIRING TIE RODS

TRANSVERSE SECTION



SECTION A - A

CONCRETE COLLAR DETAIL

JOINT TIES FOR CONCRETE PIPE AND CONCRETE COLLAR DETAIL

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION

APPROVED
November 2021 /S/ Rodney Taylor
DATE ROADWAY STANDARDS DEVELOPMENT
FHWA ENGINEER